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# **2012 Post-Election Quantitative Voting Survey**

## **Statistical Methodology Report**

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**2012 POST-ELECTION QUANTITATIVE VOTING  
SURVEY:  
STATISTICAL METHODOLOGY REPORT**

**Defense Manpower Data Center**  
**Human Resources Strategic Assessment Program**  
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## **Acknowledgments**

Defense Manpower Data Center (DMDC) is indebted to numerous people for their assistance with the *2012 Post-Election Quantitative Voting Survey*, which was conducted on behalf of the Office of the Under Secretary of Defense for Personnel and Readiness (OUSD[P&R]). DMDC's survey program is conducted under the leadership of Kristin Williams, Director of the Human Resources Strategic Assessment Program (HRSAP).

Staff from the Federal Voting Assistance Program (FVAP) contributed to the development of this survey.

DMDC's Statistical Methods Branch, under the guidance of David McGrath, Branch Chief, is responsible for HRSAP's survey sampling and weighting methods. Eric Falk provided supervision and consultation of the sampling and weighting methods, as well as overall process control. The lead statistician on this survey was Timothy Markham, who developed the sample and weights for this survey. Timothy Markham and Eric Falk produced this methodology report.

# 2012 POST-ELECTION QUANTITATIVE VOTING SURVEY: STATISTICAL METHODOLOGY REPORT

## Executive Summary

The Uniformed and Overseas Citizens Absentee Voting Act of 1986 (UOCAVA), 42 USC 1973ff, permits members of the Uniformed Services and Merchant Marine, and their eligible family members and all citizens residing outside the United States who are absent from the United States and its territories to vote in the general election for federal offices. These groups include:

- Members of the Uniformed Services (including Army, Navy, Air Force, Marine Corps, Coast Guard)
- U.S. citizens employed by the Federal Government residing outside the U.S., and
- All other private U.S. citizens residing outside the U.S.

The Federal Voting Assistance Program (FVAP), under the guidance of USD (P&R), is charged with implementing the UOCAVA and evaluating the effectiveness of its programs. The FVAP Office asked DMDC to design, administer, and analyze post-election surveys on Uniformed Services voter participation, spouses of active duty members, voting assistance personnel, and local election officials. Without such surveys, the Department will not be able to assess and improve voter access. In addition, such surveys fulfill 1988 Executive Order 12642 that names the Secretary of Defense as the “Presidential designee” for administering the UOCAVA and requires surveys to evaluate the effectiveness of the program in presidential election years.

The objectives of the 2012 post-election surveys are: (1) to gauge participation in the electoral process by citizens covered by UOCAVA, (2) to assess the impact of the FVAP’s efforts to simplify and ease the process of voting absentee, (3) to evaluate other progress made to facilitate voting participation, and (4) to identify any remaining obstacles to voting by these citizens. Surveys were done of military members, military spouses, voting assistance personnel, and election officials.

This report focuses on the *2012 Post-Election Quantitative Voting Survey (2012 PEVIA)*, which was designed to capture the proliferation and effectiveness of voting among UOCAVA-covered populations.

This report describes the sampling, imputation, and weighting methodologies used in the *2012 PEVIA*. Calculation of response rates is also described in this document.

The population of interest for the *2012 PEVIA* consisted of the voting jurisdictions in the United States and the four territories. There were 7,303 voting jurisdictions covering the United States and the four territories.

The 2012 *PEVIA* survey was a sample of 2,500 voting jurisdictions with the local election official (LEO) as the respondent in states with no centralized state voting database and state election official (SEO) as the respondent in states with centralized databases as determined by FVAP. The reporting unit was the voting jurisdiction. The survey administration period lasted from December 31, 2012 to February 22, 2013. There were 1,738 usable questionnaires.

After the determination of eligibility for the survey and completion of a survey, analytic weights were created to account for varying response rates among population subgroups.

Location, completion, and response rates are provided in the final section of this report for both the full sample and for population subgroups. These rates were computed according to the RR3 recommendations of the American Association of Public Opinion Researchers (AAPOR 2011). The location, completion, and response rates were 99.0%, 77.0%, and 76.2%, respectively.

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# 2012 POST-ELECTION QUANTITATIVE VOTING SURVEY: STATISTICAL METHODOLOGY REPORT

## Introduction

The Uniformed and Overseas Citizens Absentee Voting Act of 1986 (UOCAVA), 42 USC 1973ff, permits members of the Uniformed Services and Merchant Marine, and their eligible family members and all citizens residing outside the United States who are absent from the United States and its territories to vote in the general election for federal offices. These groups include:

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The objectives of the 2012 post-election surveys are: (1) to gauge participation in the electoral process by citizens covered by UOCAVA, (2) to assess the impact of the FVAP’s efforts to simplify and ease the process of voting absentee, (3) to evaluate other progress made to facilitate voting participation, and (4) to identify any remaining obstacles to voting by these citizens. Surveys were done of military members, military spouses, voting assistance personnel, and election officials in the U.S.

This report describes sampling, editing and imputation, and weighting methodologies for the 2012 PEVIA. The first section describes the design and selection of the sample. The second section describes weighting. The third section describes the calculation of response rates, location rates, and completion rates for the full sample and for population subgroups. The final section explains the edit and imputation processes as well as the variance and estimation. Information on survey administration can be found in the *2012 Post-Election Quantitative Voting Survey: Administration, datasets, and codebook* (2013b).

## ***Sample Design and Selection***

### ***Target Population***

The 2012 PEVIA was designed to represent all voting jurisdictions in the United States and the four territories. The 2012 survey was a sample of 2,500 of the 7,303 total voting jurisdictions compared to a census of 7,296 local election officials in the 2010 survey.

### ***Sampling Frame***

The sampling unit for this study is the voting jurisdiction, which are counties for most states, but were defined differently from state to state. For example, the state of Alaska is considered to be one voting jurisdiction, whereas, Michigan, Wisconsin and the New England states define voting jurisdiction by individual townships. DMDC developed the sample frame based on a file provided by FVAP. In total there are 7,303 unique voting jurisdictions determined.

### ***Sample Design***

The 2012 PEVIA used a single stage stratified random sample design to select 2,500 jurisdictions. The population was grouped into six strata based on the number of UOCAVA ballots transmitted for the 2008 election. Because the 2008 iteration of this survey was administered to a sample of the population and not all jurisdictions responded, the UOCAVA ballots transmitted variable was incomplete. Where possible, data was filled in using the Election Assistance Commission's (EAC) 2008 survey, available from the EAC website. Some jurisdictions, though, still lacked data for the number of UOCAVA ballots transmitted in 2008. To rectify this, jurisdictions with values for transmitted ballots formed ratios of transmitted ballots to total registered voters. The median ratio (0.0031456) was then multiplied by total registered voters to impute for UOCAVA ballots transmitted in jurisdictions lacking that piece of administrative data. A total of 2,085 jurisdictions received an imputed value for UOCAVA ballots transmitted.

DMDC utilized the cumulative square root of the frequency (CSRF) method with an anticipated six strata to define stratum boundaries (Cochran, 1977). A Neyman allocation determined the optimal sample size for each stratum, shown in Table 1. Stratum sample sizes were modified slightly, as the Neyman allocation indicated sample sizes that were larger than population totals in the largest two strata. To ensure a proper sample, a census was used in the largest two strata, with the Neyman allocation being recalculated for the other strata. The CSRF method was based on the number of ballots transmitted to UOCAVA-covered voters. The strata definitions are as follows:

- 1) Jurisdictions with fewer than 12 UOCAVA transmitted ballots,
- 2) jurisdictions with 12-32 UOCAVA transmitted ballots,
- 3) jurisdictions with 33-53 UOCAVA transmitted ballots,
- 4) jurisdictions 54-104 UOCAVA transmitted ballots,

- 5) jurisdictions with 105-189 UOCAVA transmitted ballots, and
- 6) jurisdictions with 190 or more UOCAVA transmitted.

Within each stratum, individual voting jurisdictions were selected with equal probability and without replacement. However, because allocation of the sample was not proportional to the size of the strata, selection probabilities varied among strata, and voting jurisdictions were not selected with equal probability overall. Non-proportional allocation was used to achieve adequate sample sizes for national-level estimates and variance estimates.

### **Sample Allocation**

The total sample size was based on achieving precision requirements for national estimates. Anticipated eligibility and response rates were based on the *2010 Post-Election Survey of Local Election Officials*, and were modified to accommodate the inclusion of data collected by SEOs.

Only one overall domain was considered in order to make national-level estimates, and the goal was to achieve a reasonable precision for this overall estimate. In addition, an attempt was made not to overburden SEOs and LEOs by taking a sample of jurisdictions as opposed to a census. The total *2012 PEVIA* sample size was 2,500 voting jurisdictions.

**Table 1.**  
**Sample Size by Stratum**

Stratum	Population Size	Sample Size	Percent Sampled
Fewer than 12 UOCAVA transmitted ballots	4,067	632	16%
12-32 UOCAVA transmitted ballots	1,124	324	29%
33-53 UOCAVA transmitted ballots	556	162	29%
54-104 UOCAVA transmitted ballots	575	401	70%
105-189 UOCAVA transmitted ballots	319	319	100%
190 or more UOCAVA transmitted ballots	662	662	100%
<b>Total</b>	<b>7,303</b>	<b>2,500</b>	<b>34%</b>

### **Survey Administration**

Information on survey administration can be found in the *2012 Post-Election Quantitative Voting Survey: Administration, datasets, and codebook* (2013b).

## **Weighting**

### **Case Dispositions**

Final case dispositions for weighting were determined using information from field operations (the Survey Control System, or SCS), and returned surveys. No single source of information is both complete and correct; inconsistencies among these sources were resolved according to the order of precedence shown in Table 2. Execution of the weighting process and computation of response rates both depend on this classification. The same table also shows how many sampled voting jurisdictions were classified in each disposition code.

**Table 2.**  
**Case Dispositions for Weighting**

<b>Case Disposition (Samp_DC)</b>	<b>Information Source</b>	<b>Conditions</b>	<b>Sample Size</b>
1. Record Ineligible	Administrative record	Sample ineligible—jurisdiction no longer exists according to administrative data.	0
2. Ineligible by self- or proxy-report	Survey Control System (SCS)	“Jurisdiction no longer exists.”	0
3. Record Ineligible	Eligibility Questions	There was no eligibility questions asked on this survey.	0
4. Eligible, complete response	Item response rate	Item response is at least 40% of key questions.	1,738
5. Eligible, incomplete response	Item response rate	Survey isn’t blank but item response is less than 40% of key questions.	294
8. Active refusal	SCS	Reason refused is any	92
		Reason ineligible is "other"	
		Reason survey is blank is "refused-too long", "refused-inappropriate/intrusive", "refused-other", "ineligible-other", "unreachable at this address", "refused by current resident", "concerned about security/confidentiality."	
9. Returned blank	SCS	Returned survey is blank	0
10. PND	SCS	Postal non-deliverable or original non-locatable.	30
11. Non-respondent	Remainder	Remainder	346
<b>Total</b>			<b>2,500</b>

### **Nonresponse Adjustments and Final Weights**

After case dispositions were resolved, the sampling weights were adjusted for nonresponse. First, the sampling weights for cases of known eligibility (SAMP\_DC = 2, 3, 4, 5) were adjusted to account for cases of unknown eligibility (Samp\_DC = 8, 9, 10, 11). Next, the eligibility-adjusted weights for eligible respondents (Samp\_DC = 4) were adjusted to account for

eligible sample members who had not returned a completed survey (SAMP\_DC = 5). Weighting adjustment factors were computed as the inverse of eligibility and completion probabilities, respectively. In general our weights are post stratified to match population totals and to reduce bias unaccounted for by the previous weighting adjustments. Because post stratification cells were defined to match the sampling strata (UOCAVA transmitted ballots), the post stratification adjustment was equal to 1 for all jurisdictions receiving a post stratification adjustment.

Table 3 provides summaries of the distributions of the sampling weights, intermediate weights, final weights, and adjustment factors by eligibility status. Eligible respondents are those individuals who were not only eligible to participate in the survey, but also completed at least 40% of the key survey items. There were no ineligible voting jurisdictions due to either administrative or self-report data. Table 4 shows the distribution of weights at each step by eligibility category.

**Table 3.**  
***Distribution of Weights and Adjustment Factors by Eligibility Status***

Eligibility Status	Statistic	Sampling Weight	Eligibility Status Adjusted Weight	Complete Eligible Response Adjusted Weight	Final Weight With Non-response and Post-stratification Factors	Eligibility Status Factor	Complete Eligible Response Factor	Post-stratification Factor
Eligible Respondents	N	1,738	1,738	1,738	1,738	1,738	1,738	1,738
	MIN	1.00	1.27	1.56	1.56	1.11	1.06	1.00
	MAX	6.44	7.15	7.59	7.59	1.34	1.26	1.00
	MEAN	3.20	3.76	4.20	4.20	1.23	1.17	1.00
	STD	2.33	2.52	2.60	2.60	0.08	0.08	-
Self/Proxy Ineligibles	N	0	0	0	0	0	0	0
	MIN							
	MAX							
	MEAN							
	STD							
Non-Respondents	N	762	294	0	0	294	0	0
	MIN	1.00	1.27			1.11		
	MAX	6.44	7.15			1.34		
	MEAN	2.28	2.63			1.26		
	STD	1.84	2.00			0.06		
Record Ineligibles	N	0	0	0	0	0	0	0
	MIN							
	MAX							
	MEAN							
	STD							

**Table 4.**  
***Sum of Weights by Eligibility Status***

<b>Eligibility Category</b>	<b>Sum of Sampling weights</b>	<b>Sum of Eligibility Status Adjusted Weights</b>	<b>Sum of Complete Eligible Response Adjusted Weights</b>	<b>Sum of Final Weights</b>
Eligible Respondents	5,566	6,530	7,303	7,303
Self/Proxy Ineligibles	0	0	0	0
Non-Respondents	1,737	773	0	0
Record Ineligibles	0	0	0	0

### ***Location, Completion, and Response Rates***

Location, completion, and response rates were calculated in accordance with the recommendations for Sample Type II response rates (Council of American Survey Research Organizations, 1982). This definition corresponds to The American Association for Public Opinion Research RR3 (AAPOR, 2011), which estimates the proportion of eligible cases among cases of unknown eligibility.

Location, completion, and response rates were computed for the *2012 PEVIA* as follows:

The *location rate* (LR) is defined as:

$$LR = \frac{\text{adjustedlocatedsample}}{\text{adjustedeligible sample}} = \frac{N_L}{N_E}.$$

The *completion rate* (CR) is defined as

$$CR = \frac{\text{usableresponses}}{\text{adjustedlocatedsample}} = \frac{N_R}{N_L}.$$

The *response rate* (RR) is defined as

$$RR = \frac{\text{usableresponses}}{\text{adjustedeligible sample}} = \frac{N_R}{N_E}.$$

where

- $N_L$  = Adjusted located sample
- $N_E$  = Adjusted eligible sample
- $N_R$  = Usable responses.

To identify the cases that contribute to the components of LR, CR, and RR, the disposition codes were grouped as shown in Table 5.

**Table 5.**  
***Disposition Codes for Response Rates***

<b>Response Category</b>	<b>SAMP_DC Values</b>
Eligible Sample	4, 5, 8, 9, 10, 11
Located Sample	4, 5, 8, 9, 11
Usable Response	4
Not Returned	11
Eligibility Determined	2, 3, 4, 5, 8, 9
Self Report Ineligible	2, 3

### ***Ineligibility Rate***

The ineligibility rate (IR) is defined as:

$$IR = \text{Self Report Ineligible} / \text{Eligibility Determined}.$$

### ***Estimated Ineligible Postal Non-Deliverable/Not Located Rate***

The estimated ineligible postal non-deliverable or not located (IPNDR) is defined as:

$$IPNDR = (\text{Eligible Sample} - \text{Located Sample}) * IR.$$

### ***Estimated Ineligible Nonresponse***

The estimated ineligible nonresponse (EINR) is defined as:

$$EINR = (\text{Not Returned}) * IR.$$

### ***Adjusted Location Rate***

The adjusted location rate (ALR) is defined as:

$$ALR = (\text{Located Sample} - \text{EINR}) / (\text{Eligible Sample} - \text{IPNDR} - \text{EINR}).$$

### ***Adjusted Completion Rate***

The adjusted completion rate (ACR) is defined as:

$$ACR = (\text{Usable Response}) / (\text{Located Sample} - \text{EINR}).$$

## Adjusted Response Rate

The adjusted response rate (ARR) is defined as:

$$\text{ARR} = (\text{Usable Response})/(\text{Eligible Sample} - \text{IPNDR} - \text{EINR}).$$

## Final Sample Counts, Location, Completion, and Response Rates.

The unweighted and weighted sample counts used to compute the overall response rates are shown in Table 6. The final response rate was the product of the location rate and the completion rate. The unweighted and weighted rates are shown in Table 7. The final sample counts, usable response counts, sums of weights, weighted location, weighted completion, and weighted response rates for the full sample and strata are shown in Table 8.

**Table 6.**  
*Comparison of the Final Sample Relative to the Drawn Sample*

Case Disposition Categories	Sample Counts		Weighted Estimates	
	n	%	n	%
<b>Drawn sample &amp; Population</b>	<b>2,500</b>		<b>7,303</b>	
Ineligible on master files	0	0.00%	0	0.00%
Self-reported ineligible	0	0.00%	0	0.00%
<b>Total: Ineligible</b>	<b>0</b>	<b>0.00%</b>	<b>0</b>	<b>0.00%</b>
Eligible sample	2,500	100.00%	7,303	100.00%
Not located (estimated ineligible)	0	0.00%	0	0.00%
Not located (estimated eligible)	-30	1.20%	-74	1.01%
<b>Total not located</b>	<b>-30</b>	<b>1.20%</b>	<b>-74</b>	<b>1.01%</b>
Located sample	2,470	98.80%	7,229	98.99%
Requested removal from survey mailings	-92	3.68%	-236	3.23%
Returned blank	0	0.00%	0	0.00%
Skipped key questions	-294	11.76%	-632	8.65%
Did not return a survey (estimated ineligible)	0	0.00%	0	0.00%
Did not return a survey (estimated eligible)	-346	13.84%	-795	10.89%
<b>Total: Nonresponse</b>	<b>-732</b>	<b>29.28%</b>	<b>-1,663</b>	<b>22.78%</b>
Usable responses	1,738	69.52%	5,566	76.21%



**Table 7.**  
***Location, Completion, and Response Rates***

Type of Rate	Computation	Unweighted Rate	Weighted Rate
Location	Adjusted located sample/Adjusted eligible sample	98.8%	99.0%
Completion	Usable responses/Adjusted located sample	70.4%	77.0%
Response	Usable responses/Adjusted eligible sample	69.5%	76.2%

**Table 8.**  
***Rates for Full Sample and Stratification Levels***

Domain	Sample	Usable Response	Sum of Weight	Location Rate	Completion Rate	Response Rate
Fewer than 12 UOCAVA transmitted ballots	632	536	4,067	99.2%	85.5%	84.8%
12-32 UOCAVA transmitted ballots	324	226	1,124	99.1%	70.4%	69.8%
33-53 UOCAVA transmitted ballots	162	99	556	98.8%	61.9%	61.1%
54-104 UOCAVA transmitted ballots	401	267	575	97.5%	68.3%	66.6%
105-189 UOCAVA transmitted ballots	319	205	319	99.7%	64.5%	64.3%
190 or more UOCAVA transmitted ballots	662	405	662	98.6%	62.0%	61.2%
<b>Total</b>	<b>2,500</b>	<b>1,738</b>	<b>7,303</b>	<b>99.0%</b>	<b>77.0%</b>	<b>76.2%</b>

### ***Edit and Imputation Processes***

To calculate estimated totals from the survey data, edit and imputation processes were developed for the items with missing data. Without an edit and imputation process, the estimated totals will underrepresent the actual total. The **edit** process is the inspection of collected data prior to statistical analysis. The goal of editing is to verify that the data have properties intended for the original design. An **imputation** process places an estimated answer into a data field for a record that previously had no data or had incorrect or implausible data.

### ***Edit Process***

#### ***Data Validation Edits***

A number of data validation checks and edits were performed on the numeric data entered in the 2012 PEVIA survey and are described below.

***Calls to LEOs and SEOs:*** Because previous iterations of this survey have shown a small number of jurisdictions to respond with illogical data that can likely be attributed to incorrect input or misinterpretation of the question, DMDC monitored survey responses as they were returned during the field period. DMDC compiled a weekly list of LEOs and SEOs that provided numbers far outside of expectation (for instance, if their numbers indicated more than

10% of their total registered voters were UOCAVA-covered) for FVAP to contact and either confirm their original data or resubmit with correct information.

***Collapsing Military:*** On the survey, several questions asked for a Total as well as a breakdown by Domestic Military, Overseas Military, and Overseas Civilians. However, several SEOs appeared not to collect data at this granular level and chose to fill out one of the Military subparts with all of their Military data and to leave the other Military subpart blank. As a result, DMDC decided to collapse the Military categories into one overall Military subpart, which is a total of the Domestic and Overseas Military subparts.

***Creating Totals:*** If a respondent entered values for all subparts of a question (Military and Overseas Civilians, for example) but left the Total blank, a Total was calculated for them by adding the responses provided. All subparts required responses in order for a Total to be calculated.

***Correcting Totals:*** If a respondent entered values in for some or all of the subparts of a question as well as the Total for that question, the sum of the subparts was compared to the Total. If all subparts were answered and the Total was less than the sum of the subparts, the Total was set equal to the sum of the subparts. If the respondent left at least one subpart blank but the sum of the subparts was still greater than the provided Total, the Total was set equal to the sum of the subparts and any missing subparts were set to zero.

***Questions with Logical Relationships:*** Some questions in the 2012 PEVIA survey had logical relationships with each other where one question's responses should be less than or equal to those of another question. For example, the total number of FWABs counted (Q18a) should be less than the total number of FWABs that were received (Q14a). For this example, if the number of FWABs counted was greater than the number of FWABs received, the value entered for FWABs counted was set to be the value entered for FWABs received. This alleviates the possibility of having a ratio that is over 100%, which is not possible.

### ***Imputation Process***

After the data validation edit process, the imputation process, which consisted of three steps, began. The first imputation process involved placing estimated values into data fields for questions that a jurisdiction answered incompletely. When the jurisdiction entered a Total and a value for either Military or Overseas Civilians but not both, the value imputed into the unanswered subpart was equal to the difference between the Total and the sub-item that was answered.

The next step in imputation involved questions where a jurisdiction provided values for the Total, but neither Military nor Overseas Civilians. To estimate values for these questions, unweighted sums for Military, Overseas Civilians, and Totals were created from all respondents who answered all sub-items of the question. These Totals were used to create the proportions of each question that were allocated to each sub-item and were calculated separately for each stratum. These proportions were then applied to the jurisdictions that provided only a Total to impute estimates for Military and Overseas Civilians.

The final step of the imputation process was designed to produce estimates for respondents who did not provide a value to any sub-item of a question. For this stage, a multiple weighted sequential hot deck imputation procedure was used (Ellis, 2007). For weighted sequential hot deck imputation, the population was divided into subgroups of similar jurisdictions. For jurisdictions with missing data, donor jurisdictions were selected at random from complete cases within the same subgroup. For all questions, the subgroups were based on the number of transmitted UOCAVA ballots, as defined in the strata, and the type of jurisdiction (County or sub-County). No donor was selected more than three times. In order to preserve the logic within questions, only subpart data were imputed. The subparts were then summed to create Totals and subjected to the same validation edits enumerated in the previous section.

### ***Variance and Estimation***

Estimates from the 2012 *PEVIA* have uncertainty due to unit and item nonresponse. Unit nonresponse was about 24 percent and item nonresponse ranged from 0 to 40 percent for most survey questions that estimated numeric totals. We used weighting to compensate for unit nonresponse and imputation to adjust for item nonresponse. To create national estimates, missing information from responding jurisdictions was imputed and a weighting process was developed so that totals would represent all jurisdictions.

Margins of error were estimated using SUDAAN® PROC DESCRIPT. However, PROC DESCRIPT uses only one dataset, which does not account for the added uncertainty due to the imputations. To properly account for the variance in the estimated totals due to item nonresponse, we used multiple imputations and created estimates using SAS® PROC MIANALYZE, which isolated the inflation of overall variance estimates attributed to the imputations. As a result, the variances of national estimates from PROC DESCRIPT were increased 10%, which caused margins of error to be inflated by approximately 4.8%.



## References

- American Association for Public Opinion Research. (2011). *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys (7th edition)*. AAPOR.
- Cochran, W. G. (1977). *Sampling Techniques, 3<sup>rd</sup> Edition*. John Wiley & Sons, Inc. 127-131.
- Council of American Survey Research Organizations. (1982). *On the definition of response rates* (special report of the CASRO task force on completion rates, Lester R. Frankel, Chair). Port Jefferson, NY: Author.
- DMDC. (2013a). *2012 Post-Election Quantitative Voting Survey* (Report No. 2013-006). Alexandria, VA: Author.
- DMDC. (2013b). *2012 Post-Election Quantitative Voting Survey: Administration, datasets, and codebook* (Report No. 2013-025). Alexandria, VA: Author.
- Ellis, Bruce. (2007). "A Consolidated Macro for Iterative Hot Deck Imputation." *Proceedings of the 2007 Northeast SAS Users Group Conference*. Arlington, VA.



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